A Collaborative Effort to Collect Biological, Chemical, and Geological Data to Quantify the Interrelationships that Influence Stream Impairment

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Evaluation of the current condition is critical to the management of streams impaired by sediment and other non-point source stressors, which adversely affect both physical habitat and water quality. Impairment is generally assigned based on biological criteria, which are derived from an evaluation of the composition, diversity, and well-being of the aquatic biological community, but the root causes of the impairment are frequently the result of changes in the physical environment and water quality. It should be possible to determine the interrelationships between the biological, geological, and chemical conditions within a stream; however, to do this, it is necessary to collect baseline values for streams under various degrees of impairment. For this purpose, biological, in-stream chemical, geological, and land use data were collected from 35 subwatersheds in the Little Miami River watershed, Southwestern Ohio, through collaboration between researchers from the NRMRL, NCEA, and NERL. This poster addresses the various types of data collected and the interrelationship between them. Biological data were collected using the Environmental Monitoring and Assessment Program (EMAP) protocol. This procedure collects samples for laboratory measurement of water chemistry, primary productivity, and macroinvertebrate and fish population, measures in-stream community metabolism and stream discharge, and characterizes physical habitat for aquatic organisms. All of these measurements were made at each site annually, and selected measurements were taken on a quarterly basis. In conjunction with the quarterly sampling trips, automated instruments for the measurement of dissolved oxygen, chlorophyll, pH, conductivity, and turbidity were deployed to obtain values in real time. These instruments were also deployed at eight sites that were selected for their differences in habitat quality for longer periods of time to obtain information on how these metrics vary during the day and seasonally. Geomorphological properties of the streams were measured to classify the streams based on their physical characteristics. The geomorphology of a stream is controlled by several factors, most notably the geology through which the stream is flowing, the quantity of water, and the energy contained within the moving water. These factors control the amount of erosion, sediment in transit, and deposition that influence the stability and quality of habitat available for aquatic life. Combined, these data sets provide an assessment of the current conditions in the streams and allow the development of

tools based on the biological, chemical, and geological properties to determine the best management practices for maintaining or improving a stream's biological integrity.